THE FIT
DEMONSTRATION PROJECT

HAZUS
NATURAL HAZARD LOSS ESTIMATION METHODOLOGY

FEDERAL EMERGENCY MANAGEMENT AGENCY

PACE AC BELLO MERITA

A PAMPHLET FOR PARTICIPATING COMMUNITIES

Federal Insurance and Mitigation Administration

Be Flood Alert

FEMA
Federal Emergency Management Agency

AN OVERVIEW: THE HAZUS FLOOD MODULE

The Federal Emergency Management Agency (FEMA), under contract with the National Institute of Building Sciences (NIBS), has developed a standardized, nationally-applicable earthquake loss estimation methodology. HAZUS is now being expanded into a multi-hazard methodology with new modules for estimating potential losses from wind (hurricanes, thunderstorms, tornadoes, extra tropical cyclones and hail) and flood (riverine and coastal) hazards.

The flood loss estimation methodology consists of two basic analytical processes: flood hazard analysis and flood loss estimation analysis. In the hazard analysis module, characteristics such as frequency, discharge, and ground elevation are used to estimate flood depth, flood elevation, and velocity. In the loss estimation module, physical damage and economic loss is calculated based on the results of the hazard analysis. The module results will be displayed using a series of reports and maps.

The HAZUS Flood Module will require three levels of information to perform the following levels of analysis:

- Level 1 – All of the information needed to produce a basic estimate of local flood losses will be included as default data, based on national databases and nationally applicable methods.

- Level 2 – More accurate estimates will be needed including detailed information on local conditions. Modification of default databases will be required, along with the inclusion of local data and analyses.

- Level 3 – Detailed and site-specific input data will be used to create state-of-the-art damage estimates and situation assessment profiles. Level 3 is intended for the expert user.

The HAZUS Flood Module will be distributed to those agencies and organizations that are likely to have data that can be used in HAZUS. It will be primarily distributed to floodplain officials, emergency planners, hazard mitigation officers, and National Flood Insurance Program (NFIP) coordinators as a tool to assist in planning, mitigation, and emergency response and recovery activities.

THE FLOOD INFORMATION TOOL (FIT) PROJECT

The FIT Demonstration Project is a test phase, designed to process and convert locally available flood information to data that can be used by the HAZUS Flood Module when released. The FIT is a system of instructions, tutorials, and GIS analysis scripts. When given user-supplied inputs (e.g., ground elevations, flood elevations, and floodplain boundary information), the FIT will

calculate flood depth and elevation for riverine and coastal flood hazards. The FIT is intended to help users perform Level 2 or Level 3 flood hazard analyses. The user will be allowed to input various combinations of data in order to customize the analysis, and determine the remaining data from the default values.

FIT COMMUNITIES: BENEFITS AND RESPONSIBLITIES

For the purpose of the *FIT Demonstration Project*, FEMA is seeking communities with the right combination of skills and data sets and who are willing to participate in the project. In addition to local governments, FEMA will consider state governments, universities, and private sector organization, such as utilities, for participation. The principal element is that communities participating in the FIT Demonstration Projects are leaders and proactive members of the community in the process of data collection, map preparation, and risk reduction.

FEMA has allocated funds for 10 communities (1 per FEMA region) willing to test and apply the FIT. FIT communities will be selected by FEMA Regional Offices based on various criteria described in this pamphlet.   Communities, officially participating in the *FIT Demonstration Project*, will prepare a work plan and budget to indicate how they will disburse the funds. Funds can be used to purchase labor, equipment, software, and supplies related to the testing of the FIT tool. Selected communities will work closely with FEMA staff.

In addition to the communities selected by FEMA , other communities will be able to participate in the *FIT Demonstration Project.*   Communities wishing to participate in the project can contact FEMA HQ or FEMA Regional Offices. These communities will benefit from almost all the support provided by FEMA but will not have access to the funds allocated through the FIT program.

Communities participating in the FIT project will enjoy the following benefits

- Communities will be able to run the HAZUS Flood Module as soon as it is released in 2002
- Communities will receive software capable of estimating flood depth, elevation, and velocity of flooding
- Through the FIT, communities will have large amounts of data to perform various types of flood hazard analysis
- Communities will share responsibility and accountability for flood plain mitigation with federal, state, and regional government

Communities participating in the *FT Demonstration Project* will have the following responsibilities:

- Utilize the FIT to collect and modify data necessary to run level 2 or 3 of the HAZUS Flood Module
- Test the FIT to ensure that this process can be performed
- Contact the FEMA Regional Offices or Headquarters to report problems in using the FIT
- Share processes and information on the FIT website with other FIT communities

- Provide feedback on the progress of the project to FEMA staff
- Conclude the data collection and adaptation process before the HAZUS Flood Module is released
- Acquire software, equipment, materials or labor necessary to test the FIT software

REQUIREMENTS TO PARTICIPATE

Minimum requirements to participate in the *FIT Demonstration Project* are:

- Preferably be a Cooperating Technical Partner (CTP) community

- Have interest in identifying the flood hazard for their community as shown by their commitment to collecting improved hazard data.

- Have existing processes and/or systems in place that support HAZUS, including advanced-level PC-based geographic information systems (GIS) capabilities and access to GIS and flood engineering experts.

- Have digital terrain information with better resolution than the 30-meter National Elevation Dataset available from the USGS.

- Have digital flood hazard information such as cross sections with elevation attributes and an associated flood boundary.

- Have a variety of situations (bridges, backwaters, etc) to ensure that the FIT is reasonably tested.

- Have or agree to purchase ArcView® Version 8.1 and the associated Spatial Analyst® extension.

- Ideally, have had recent flooding and have captured the depth of flooding at various known locations.
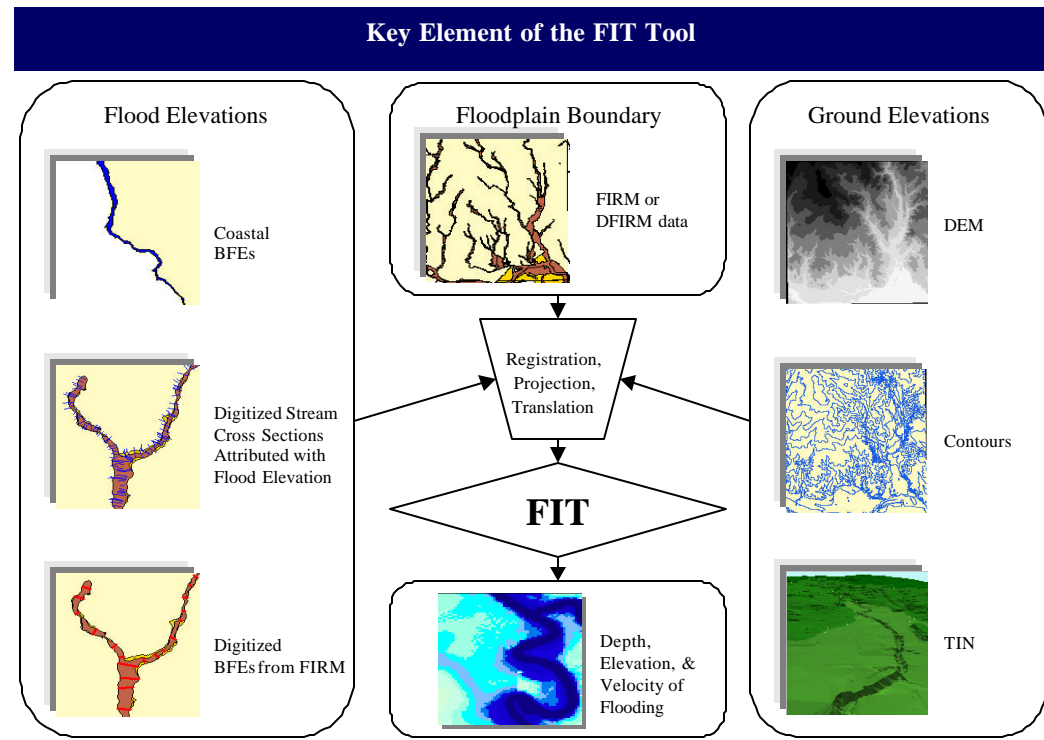
FIT FUNCTION AND CAPABILITIES

The main function of the FIT is to convert data into an appropriate format for HAZUS analysis. Input data falls into the general categories of ground elevation data, flood elevation data, and floodplain boundary data. The hazard analyses are for riverine and coastal scenarios. The FIT will be able to process and/or convert the following data:

- Ground and flood elevation data. The FIT will accept ground and flood elevation data in the ESRI grid format. Other formats will need to be converted to the ESRI grid format. The actual conversion of these user-supplied formats will primarily be performed using utilities already available in ArcView and Spatial Analyst.

- Digital flood insurance rate map (DFIRM) flood elevation polygons for coastal areas. The FIT will accept this data if it is in the

ESRI polygon feature class format.

- DFIRM flood elevation polygons for riverine areas. The FIT will accept this data if it is in the ESRI line feature class format.

- User-defined coastal flood elevation polygons developed through digitizing from a paper copy. The FIT will accept this data if it is in the ESRI polygon feature class format.

- Flood elevation polygons in the form of a paper Flood Insurance Rate Map (FIRM). These polygons must be digitized and attributed with the base flood elevation in order to be used in the FIT.

- For riverine areas, users can digitize points where cross-sections or base flood elevation (BFE) lines intersect the stream. (Collectively, the points [attributed with flood elevation(s)] define the stream baseline.) The FIT will accept this data if it is in the ESRI point feature class format.

- Riverine BFE lines digitized from a paper FIRM. These lines must be digitized and attributed with the base flood elevation in order to be used in the FIT.   The FIT will accept this data if it is in the ESRI line feature class format.

- Riverine cross-section lines, each attributed with one or more flood elevation and the corresponding recurrence interval(s). The FIT will accept this data if it is in the ESRI line feature class format.

- Hydraulic model cross-sections stored with their computed water surface elevations. Many users have flood elevation data stored in a hydraulic model coordinate system. Lines must be digitized and attributed with one or more

Key Element of the FIT Tool

Flood Elevations

Coastal BFEs

Digitized Stream Cross Sections Attributed with Flood Elevation

Digitized BFEs from FIRM

Floodplain Boundary

FIRM or DFIRM data

Registration, Projection, Translation

FIT

Depth, Elevation, & Velocity of Flooding

Ground Elevations

DEM

Contours

TIN

flood elevations and the corresponding recurrence interval(s) in order to be used in the FIT. This data must be converted into a GIS through digitizing or some automated routine in order to be used by the FIT.

- Shore-normal transect lines attributed with one or more flood elevations and the corresponding recurrence interval(s). The FIT will accept this data if it is in the ESRI line feature class format.

- Mass points attributed with one or more flood elevation (s) and the corresponding recurrence interval (s). An example is a point file representing high water marks. The FIT will accept this data if it is in the ESRI point feature class format.

- Points in the form of a digitized streamline coupled with a table of stream distances and associated flood elevations. The FIT will accept this data if it is in the ESRI point feature class format.

MANAGEMENT

FEMA Headquarters will work closely with FEMA Regional Offices. Communities will work primarily through their respective FEMA Regional Office contact person. Management staff and FIT communities are as follows:

FEMA	Selected FIT Communities
Mila Kennett FIT Project Manager FEMA Headquarters 202-646-4158 Milagros.Kennett.fema.gov	None
Mike Goetz Region I 617-223-9571 Mike.Goetz@fema.gov	Saco, York County, ME

John Benn   Prince George's County
Region III
215-931-5526
John.Benn@fema.gov and Jon.Janowicz@fema.gov

Laura Algeo   Charlotte/Mecklenburg County Storm Water Service, North Carolina
Region IV
770-220-5515
Laura.Algeo@fema.gov

Richard Roths   Evansville, Indiana
Region V
312-408-5324
Richard.Roths@fema.gov

Gary Zimmerer   City of Austin, Texas
Region VI
940-898-5161
Gary.Zimmerer@fema.gov

Bob Franke   Johnson County, KS
Region VII
816-283-7073
Bob.Franke@fema.gov

Dan Carlson   Utah Comprehensive Emergency Management, Utah
Region VIII
303-235-4825
Dan.Carlson@fema.gov

Michael Hornick   Scottsdale, AZ
Region IX
415-923-7260
Michael.Hornick@fema.gov

Lawrence Basich   Whatcom County, WA
Region X
425-487-4703
Lawrence.Basich@fema.gov

FIT WEBSITE FEATURE

For the implementation of the FIT Demonstration Project, FEMA is in the process of establishing an interactive web-based forum. This feature will allow FIT Communities to communicate and share files, to post messages and files, and download and have access to a large amount of data. The site will have introductory web page(s) and a monthly bulletin will be posted featuring articles related to the communities involved in the FIT Demonstration Project.

TIMELINES

Final selection of the participating communities should be completed by June 30, 2001
Community work plan should be developed and funds provided by September 28, 2001
Communities should initiate FIT testing by February 2002
Communities should end FIT testing by December 31, 2002